

Module 9 Overview

Introduction

In the previous modules we have seen a set of ML techniques based on different criteria, whose common aspect being the shallow structure that can be expressed in primal or dual spaces or, in the case of infinite dimension Hilbert spaces, they can only be expressed in dual form. In this module we will review a set of ML procedures that differ from the previous one basically in that its structure is different. Ensemble learning structures can be seen as a weighted mixture of simple learners whose power relays in their combination. Usually the expression of such structures can be given only in a primal formulation. The implementations shown in this module are trees, random forests and boosting algorithms, though multilayer perceptrons can also be seen as ensemble structures.

Learning Objectives

By completing the *readings*, students will be able to:

- Reproduce the concept of ensemble learning
- Describe the basic procedure to construct trees and random forests.
- Describe and reproduce the Adaboost algorithm

Required Instructional Materials

- Class slides

Supplementary Materials

- Students are welcome to review the following complementary materials
 - [Robert E. Schapire](#), [Explaining Adaboost](#)
 - K. Murphy, Machine Learning, A probabilistic Perspective, MIT Press, Chapter 16. Available Online through UNM Libraries.



*Sophia Vasilyevna Kovalevskaya.
Russian mathematician who made
important contributions to analysis,
partial difference equations and
mechanics. She was the first woman to
obtain a PhD in mathematics.*

Module 9 Summary

This module only contains a set of slides for the students to review.

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